The Imperial Forestry Institute
University of Oxford

ELEVENTH ANNUAL REPORT

1934—35

AND

PROSPECTUS

IMPERIAL MYCOLOGICAL INSTITUTE
17 FEB. 1936

Oxford
THE HOLYWELL PRESS, LTD.
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Professor A. W. Borthwick, O.B.E., F.R.S.E., University of Aberdeen.

UNIVERSITY OF OXFORD.

ELEVENTH ANNUAL REPORT OF THE IMPERIAL FORESTRY INSTITUTE.

ACADEMIC YEAR, 1934—35.

I. STAFF.

Personnel. The following was the constitution of the staff during the year :—

DIRECTOR.

Professor R. S. TROUP, C.M.G., C.I.E., M.A., D.Sc. (Oxon.), F.R.S.

LECTURERS AND DEMONSTRATORS.

Silviculture: THE DIRECTOR; R. BOURNE, M.A. (Oxon.); J. MACDONALD,*† B.Sc. (Edin.).

Forest Economics and Policy: THE DIRECTOR; R. BOURNE, M.A.

Forest Management: R. BOURNE, M.A.

Pathology (Mycology): W. R. DAY, B.Sc., M.A. (Oxon.); T. R. PEACE, M.A. (Cantab.).

Structure and Properties of Wood: L. CHALK, M.A., D.Phil. (Oxon.); Miss M. M. CHATTAWAY, B.Sc., M.A. (Oxon.).

Forest Zoology: R. N. CHRYSTAL, D.Sc. (Edin.), Hon. M.A. (Oxon.); J. M. B. BROWN, B.Sc. (Belfast).

Forest Botany: J. BURTT DAVY, M.A. (Oxon.), Ph.D. (Cantab.); A. C. HOYLE, B.Sc., M.A. (Oxon.).

Surveying: M. O'C. TANDY,* D.S.O., O.B.E., M.A. (Oxon.).

Forest Engineering and Utilization: A. H. LLOYD, M.C., M.A. (Oxon.).

Forest Law: H. S. WILLIAMSON,* M.A. (Oxon.).

Secretary: Miss K. ALLISON-BROWN, B.A. (Oxon.).

Librarian: Miss G. GUINEY.

* Part-time Lecturers.

† Forestry Commission Research Officer attached to the Institute.

2. There was no change in the personnel during the year. Dr. Helen Bancroft and Miss J. Dickson, although not salaried members of the staff, continued to work at the Institute on problems of wood anatomy and systematy. The continuation of this work has again been made possible by a grant to Dr. Bancroft from the Christopher Welch Fund, while the grant from the British Association for the purchase of instruments, already made in 1933, was renewed in 1934. A travelling Fellowship given to Dr. Bancroft by her College, Lady Margaret Hall, will make it possible for her to continue her work on the elm, both in the field and in various continental herbaria. The work of Miss M. M. Chattaway, of the Section of Wood Structure, has again been materially assisted by a grant from the Christopher Welch Fund.

3. In June, 1935, the Director proceeded on a mission to Tanganyika Territory, after which he was to attend the British Empire Forestry Conference in South Africa.

4. *Appointment of New Director.* The Imperial Forestry Institute was established in 1924 as a part of the Department of Forestry in the University, the School of Forestry forming the other part. Hitherto the School and the Institute, while their identity and finances have been kept separate, have both been under the immediate charge of the University Professor of Forestry, who has been *ex officio* Director of the Institute. During recent years the work of the Institute has increased to such an extent, both in volume and in range, that the need of some measure of relief for the Professor has become apparent. It has therefore been decided that while the Professor shall continue, as hitherto, to be head of the Department, and to remain in general administrative charge of the School and the Institute, the necessary relief shall be afforded to him by the appointment of a separate Director of the Institute, who will be immediately responsible for carrying out the policy that may be laid down from time to time by the Committee. It is hoped that in this way the work of the Institute may be developed to meet more effectively and on a broader basis the needs of the various forest services of the Empire, while affording the Professor more time for research and for the duties connected with his Chair. Under this arrangement Mr. J. N. Oliphant, Deputy Director of Forestry, Malaya, has been appointed Director of the Institute.

II. *STUDENTS.*

5. *Number and Classification.* The number of students attending courses of study for the whole year or for shorter periods was fourteen. These may be classified as follows :—

				Total 1934-35	*Average of previous 5 years*
POST-GRADUATE PROBATIONERS.					
Colonies :	Ceylon		1		
	Gold Coast ...		2		
	Nigeria		1		
			—	4	9
FOREST OFFICERS ON LEAVE.					
Colonies :	Northern Rhodesia		1		
	Nyasaland ...		1		
	Palestine ...		1		
	Trinidad		1		
			—	4	
India :	Burma		2		
	Kashmir		1		
			—	3	
Dominions :	New Zealand		1	1	15
PRIVATE STUDENTS.				2	2
				—	—
				14	26
				—	—

6. The effect of the recent financial depression is still reflected in the small number of students attending the Institute. With a revival of recruitment for the forest services the number may be expected to approach the normal once more.

7. *Diploma in Forestry.* Two students satisfied the examiners, and were awarded the Diploma in Forestry after the close of the year. Their names and the special subjects on which theses were written are as follows :—

E. Y. Cutten, St. Catherine's Society : ' The Rate of Growth and Establishment of Beech Seedlings in the Chilterns.'

Sarup Singh Malik, The Queen's College : ' The Botanical Composition of certain Black Forest Types.'

III. *INSTRUCTION AND RESEARCH.*

1. SILVICULTURE AND FOREST MANAGEMENT.

8. *Staff.* The Director and Mr. Bourne shared the work of this section, while Mr. J. Macdonald, Forestry Commission Research Officer attached to the Institute, gave assistance in regard to British forestry and methods of research. Questions

relating to forest soils were dealt with in the Soil Science Laboratory, under Mr. C. G. T. Morison.

9. *Instruction.* A course of lectures in tropical silviculture was given by the Director. Mr. Bourne lectured on stock-taking and working plans and undertook a series of demonstrations in the field with reference to regional survey and its significance in forest management. Certain students of the Institute also attended Mr. Bourne's lectures to the School of Forestry on management and silvicultural systems, and took part in a reconnaissance and soil survey of the Ecclesiastical Commissioners' woods near Watlington in the Chilterns. Three students worked directly under Mr. Bourne, one for the B.Sc. Degree and two for the Diploma in Forestry. Four forest officers on leave discussed with Mr. Bourne problems of silviculture and management relating to their respective territories—N. Rhodesia, Nyasaland, Palestine and Trinidad. Mr. Macdonald gave a course of instruction on experimental and statistical methods as applied to silviculture. Methods of nursery practice and experimental work were demonstrated by him in Kennington nursery. Three students received instruction in the Soil Science Laboratory.

10. During the Long Vacation Mr. Bourne conducted a tour in the Vosges, Jura, Swiss Plateau and Black Forest to study in particular spruce, silver fir, beech and Scots pine forests under different conditions and varying treatment. The many forest types which occur in these regions having previously been identified and defined, special attention was paid to the utilization of timber from distinct types. The general superiority or inferiority of timber from different types and the extent to which the quality is affected by different silvicultural treatments are important considerations which can be well illustrated in the forests visited. The tour was attended throughout by the probationers for the Colonial Forest Service and in part by three officers on leave and one private student from Canada. Two of these first attended the School of Forestry tour in Normandy under Mr. Lloyd. Arrangements were also made for special visits to forests in Denmark, Holland, Southern France and Italy. Special visits to Forestry Commission areas in Great Britain were arranged by Mr. Macdonald for students from New Zealand and Palestine. The Institute is much indebted to the many forest officers whose districts were visited in the course of touring in Britain and on the Continent.

11. *Research.* Special research on problems of physiology and soils in relation to forestry still remained in abeyance for

lack of funds. Mr. Bourne extended his regional survey in Southern England, in particular in the London Basin and the Weald, and has recognized and defined a further thirteen unit regions. The total area surveyed to date is approximately 2,000 square miles and includes a wide variety of local conditions. The recurrence, within each major region, of several examples of each regional type, a fact first established in the chalk uplands, was confirmed as a general principle in other major regions sampled. The work of posting the data collected has begun and is serving to demonstrate the extent to which the regional division furnishes the necessary background for all rural planning and advisory work, whether in relation to agriculture, forestry or amenity.

12. *Advisory Work.* A considerable amount of advisory work was undertaken, and enquiries were received from many countries. Several working plans were received from the Conservator of Forests, Trinidad, for examination and comment. The final draft of Mr. C. M. Harris' Provisional Working Plan for the Budongo Forest, Uganda, was prepared for press.

2. SYSTEMATIC FOREST BOTANY.

13. *Staff and Instruction.* Dr. Burtt Davy remained in charge of this section, with Mr. A. C. Hoyle as assistant. Seven students attended the regular courses of instruction; of these, three were probationers for the Colonies, three were forest officers on leave, representing Palestine, Kashmir and Uganda, and one was a private student.

14. *Botanical Identifications.* The total number of botanical identifications completed during the year was 2,756. This represents a drop of 1,660 specimens. An analysis of the figures shows that this drop is due in part to the financial difficulties of the several Colonial Forest Departments, which have resulted in the retrenchment of staffs, which in turn has affected the collection of botanical material. The actual effect of this falling off, however, is not reflected immediately in the identification lists, owing to the necessary lag between collection, despatch, receipt and identification of the material. The number of specimens identified for the Forest Products Research Laboratory was 301.

15. In the process of identification one new genus and thirteen new species of trees and shrubs from tropical Africa have been brought to light. These have been published, or ac-

cepted for publication in the *Kew Bulletin* and the *Icones Plantarum;* they include *Burttdavya nyasica* Hoyle, *gen. et. sp. nov., Belonophora coriacea* Hoyle, *Dalbergia glandulosa* Dunkley, *Dasylepis burtt-davyi* Edlin, *Diospyros vaughaniae* Dunkley, *Drypetes vignei* Hoyle, *Ekebergia velutina* Dunkley, *Gelonium occidentale* Hoyle, *Grewia velutissima* Dunkley, *Grossera vignei* Hoyle, *Hibiscus burtt-davyi* Dunkley, *Pterocarpus martinii* Dunkley, *Sabicea rosea* Hoyle, *Strychnos bicirrhifera* Dunkley.

16. *Check Lists.* The first to be printed of the several check lists referred to in previous reports is that for the Uganda Protectorate, which was issued during the year. It is due largely to the energy of the Conservator of Forests, Mr. Brasnett, and his Assistant Conservators, particularly Mr. Harris and Mr. Eggeling, that the draft check list prepared by the Imperial Forestry Institute has been revised and brought up to date. Mr. Brasnett has added to the list of species a short account of the floristic composition of the forests, and notes on the more important timber trees of the Protectorate. The check list enumerates 1,146 named species and varieties of trees and shrubs, belonging to 452 genera and 107 families. In addition, 49 species of exotics are included. An important fact brought out by the publication of this check list is the number of species not yet fully identified owing to the lack of sufficiently complete material; some of these are obviously undescribed species, and it is hoped that additional material for description will soon become available. The Nyasaland check list is now ready for publication, and only awaits the provision of funds for this purpose. The progress made is due largely to the efforts of the Conservator of Forests, Mr. Clements, and his three Assistant Conservators. Progress has also been made with the other check lists on which the Institute is engaged.

17. *Composition of the tropical African Forests.* A primary object of the check list is to provide means for ascertaining the available forest resources of the tropical African Colonies. For the purposes of a report on the origin and distribution of the woody vegetation and flora of tropical Africa, which Dr. Burtt Davy was asked to prepare for the Imperial Botanical Conference, London, 1935, it became necessary to compile a preliminary census of the trees and shrubs of tropical Africa. This census enumerates 12,458 species, distributed among 950 genera belonging to 132 familes. The number of species recorded requires critical revision. A few of the names included are probably synonymous; some species may be only sub-shrubs,

and a few temperate African species have yet to be weeded out. If 20 per cent. of the names are deducted for these reasons, it still leaves a round figure of 10,000 species of trees and shrubs in tropical Africa. It is certain that revision of incompletely known genera will result in the addition of a considerable number of species. Of this large number the uses, or potential value, of only very few are at present known. These figures give some idea of the difficulty which the forest officer in tropical Africa has to face in dealing with such a bewildering number of species, and emphasizes the necessity for a sound knowledge of the families to which the trees and shrubs belong.

Three primary types of forest vegetation are recognised in tropical Africa: (1) the low-level tropical rain forest, (2) the mountain rain forest, and (3) the savannah country, which includes both forest with closed canopy and woodland with more or less open canopy. The mahogany and other commercial timbers exported from tropical Africa are obtained mainly from the rain forest, which occupy only a very small part of the region. The savannah country, which covers by far the largest part of tropical Africa, is rich in tree species. The trees are usually smaller than those of the rain forest, but some of them are of considerable commercial value in spite of their small size, though little or nothing is yet known as to the potential economic value of most of them.

18. *Floral Anatomy.* Miss J. Dickson has carried out various investigations concerning floral anatomy, particularly in connection with the problems of free central placentation, parietal placentation, and the gynobasic style. An account of her work on carpel differentiation in the Rhoeadales was given before the Linnean Society, and a paper by her on the evolution and relationships of the Primulaceae has been accepted for publication by the American Journal of Botany. A review of the recent extensive work on floral morphology was prepared for an American committee by Dr. Bancroft.

19. *Morphology in Relation to Wood Anatomy.* In collaboration with the Section of Wood Structure further progress has been made in the correlation of morphological features of plant families with their wood anatomy. This has led to the preparation by Dr. Burtt Davy of a paper on the Taxonomic Position of the Sympetalae-Pentacyclicae for presentation to the Sixth International Botanical Congress, Amsterdam, 1935. The work already done has demonstrated the great value to the taxonomist, of correlation of the wood anatomy and the gross morphology of plant families. Such studies are likely to give a clearer

concept of the affinities of obscure genera and families, and will thus aid in the development of a classification better adapted to their identification.

20. *Systematy of Monotoideae.* Research into the systematic anatomy of the Monotoideae was continued by Dr. Helen Bancroft and Miss Dickson, further supplies of material having come to hand through the Royal Botanic Gardens, Kew, and the British Museum. This material supports the conclusions already arrived at, namely, that the Monotoideae form a circumscribed group more closely related to the true dipterocarps than to the Tiliaceae, and that their timbers are unlikely to be of any general economic value. Interesting possibilities with regard to the previous history of the Dipterocarpaceae on the African Continent are indicated by material recently sent from Nigeria by Mr. J. H. Mackay. Miss J. Dickson has been working this year particularly on the leaf-characters of *Monotes,* with a view to the compilation of a key for the use of forest officers ; she has arrived at the conclusion that the members of the genus fall into fairly definite groups, and that the number of species listed by various collectors may possibly be reduced considerably. Dr. Bancroft and Miss Dickson have been entrusted with the revision of the British Museum Monotoids.

21. *The Cricket-bat Willow.* The study of the cricket-bat willow has been continued. The advice of the Institute has been sought by several prominent growers, and further cases of substitution of forms of × *Salis viridis* for *S. alba* var. *caerulea* have come to light. Such cases have involved heavy financial loss to the growers. On one estate visited, 500 specimens of a well-known and widely disseminated hybrid were supplied, some fifteen years ago, under the name of cricket-bat willow ; these have made extremely slow growth, whereas a few true caeruleas used to fill vacancies, and planted several years later, now greatly exceed them in size. Not only are the hybrid trees in question worthless as sources of bat-clefts, but the original cost of the sets, the use of the ground, and the cost of cultivating and handling the crop, have been a dead loss to the grower, who ought now to be reaping a return on his outlay.

22. *Elm Investigations.* The elm studies begun by Dr. Bancroft in 1933 have been continued in the Cotentin region of Lower Normandy, the south of England, the east of Scotland, and in south-west Ireland ; the later investigations have been concerned more particularly with the origin of the English elm, *Ulmus campestris* L., and of the Guernsey elm, *Ulmus stricta*

var. *sarniensis* Moss. Interesting observations were made in the Cotentin in July, 1935, concerning the connection between habit-type and climatic conditions, the effect of growth-conditions on the quality of the timber, and the effect of the introduction of *Ulmus montana* Stokes in the neighbourhood of Bricquebec.

23. *Nomenclature.* In last year's report mention was made of the steps being taken to avoid the frequent changes in the botanical nomenclature of forest trees which have caused so much inconvenience in the past. The motions in favour of *nomina specifica conservanda,* prepared by the Institute for presentation to the Sixth International Botanical Congress, received the whole-hearted support of forest departments and societies throughout the Empire, of the Empire Forestry Conference held in South Africa in 1935, and of numerous scientific bodies. The Congress appointed an International Committee, of which Dr. Burtt Davy is a member, to prepare a list of trees of economic importance. The correct names of the trees are to be determined and published by the Committee, and the names as published are to remain stable for a period of not less than ten years. While it is regretted that the Congress did not see its way to accept the principle of the conservation of specific names which are well established and in common use, even though they may not be the oldest under the International Rules, the compromise effected is a step in the right direction. It places the responsibility for the interpretation of the Rules as it affects the names of forest trees upon an International Committee, whose opinion will have the weight of authority behind it. Being international, the Committee will be able to co-ordinate the names of forest trees grown both in Britain and on the Continent. A list which is stabilized for ten years will probably remain in permanent use, and it will have cleared the ground of numerous doubtful synonyms which have caused much of the uncertainty as to the validity of names.

24. *University Park.* The work of naming the trees in the University Park has been continued, 108 additional trees having been named and labelled.

25. *Experiment in hybridizing Larch.* In last year's report mention was made of an attempt to hybridize *Larix decidua* Mill. with pollen of *L. leptolepis* Murr. Some of the hybrid cones proved to be unfertile, but germination was obtained from others, and the seedlings will be kept under observation.

26. *Reference Herbarium.* The number of botanical specimens received during the year was 4,739, and the number

mounted for the collection was 5,893. The total number of mounted sheets in the reference herbarium at the end of the year was 53,887. A classified list of herbarium accessions is given in Appendix III and a statement of exchanges in Appendix IV.

27. *Acknowledgements.* The Institute is again much indebted to the Director and staff of the Royal Botanic Gardens, Kew, and to the Keeper of Botany and staff of the British Museum (Natural History) for facilities for consulting the collections under their charge, for the loan of material, for information on questions of nomenclature, and for the identification of herbaceous plants. The Director of Kew has continued to publish the descriptions of new species, and other papers, in the *Kew Bulletin.* Acknowledgements are again due to Prof. Dr. W. Robyns, Director of the *Jardin Botanique de l'Etat,* Brussels, for the loan of type specimens, to Messrs. Albert Wilson, F.L.S., and H. N. Dixon, F.L.S., for assistance in the determination of mosses, and to the Sherardian Professor of Botany and the Linnean Society, London, for the loan of books.

3. STRUCTURE AND PROPERTIES OF WOOD.

28. *Staff and Instruction.* Dr. L. Chalk continued in charge of this section, with Miss M. M. Chattaway as Assistant. Four probationers, one forest officer from New Zealand, and one private student underwent courses of instruction.

29. *Research.* Miss Chattaway continued her research on the woods of the Sterculiaceae. This work has been closely connected with the revision of the family proposed by Mr. H. L. Edlin, a research student working at the Institute in 1933-34. This proposed rearrangement of the family, and the large amount of new material that has been received, have made a great many new observations and measurements necessary. These data are intended to complete the study of the subfamily Sterculiae.

30. Dr. Chalk and Miss Chattaway completed and published their work on the best method of measuring the length of vessel members. This investigation suggested some promising lines of research into the factors affecting variation in the dimensions of vessel members. It was found that the dimensions of the different parts of the vessel members are primarily dependent on total member length, modified to some extent by vessel diameter and type of perforation plate, and are therefore

redundant in a description that includes these other features. A point of considerable importance that emerged from this work is that variation, both in individual cells in a single sample and in the means of different samples, is proportional to the mean dimension. This has been found to apply also to other elements and dimensions, and has proved very useful in connection with Dr. Chalk's work as Chairman of the Committee of the International Association of Wood Anatomists concerned with the standardization of terms of size used in wood anatomy. The data collected during past years at the Institute has also proved of great value as a basis for discussion by this Committee.

31. Dr. Chalk continued his investigation of the anomalous woods during the latter half of 1934, but this research has been interrupted by the work referred to above in connection with the International Association of Wood Anatomists, and by the preparation of a paper for the symposium on the systematic value of Wood Anatomy at the Sixth International Botanical Congress.

32. Special material received from the Forest Department of the Union of South Africa was investigated and described. This work is incorporated in ' Forest Trees and Timbers of the British Empire ' No. III, which has just been published. The research on dimensions, referred to above, has found practical expression in this publication and has led to a new method of presenting the data obtained from measurements.

33. Dr. Bancroft continued her investigations of Tertiary Dicotyledons with material from Greenland, sent by the British and Stockholm Museums, and from East Africa (material sent through Professor Seward, of the Botany School, Cambridge, by Mr. V. E. Fuchs, the leader of the Rudolf Rift Valley Expedition). In connection with this work a small grant has been made by the Royal Society.

34. *Identifications.* The number of identifications carried out has again shown a considerable increase compared with the previous year. They included archaeological material from Great Britain, the Irish Free State, Egypt, and Chinese Turkestan. Of special interest are two identifications made by Dr. Bancroft for Professor Paul Jacobsthal, of the *Archäeologisches Seminar* at Marburg, Germany, who sent charcoal from a tomb of the 6th or 5th century B.C., at Hessia, and portions of a chariot from a Celtic grave of the the 4th century B.C., in the Rhine area; the charcoal proved to be beech, and the chariot wood, ash and maple.

35. *Wood Collection.* Over 1,200 specimens were added to the wood collection, including a very fine collection from the Argentine presented by H.R.H. the Prince of Wales and a further large consignment from the Forest Research Institute of the Federated Malay States. A list of accessions is given in Appendix III. Nearly 300 further specimens were sectioned and added to the permanent slide collection. In addition, over 600 slides have been received in exchange from the Forest Research Institute, Federated Malay States, Forest Products Research Laboratory, Princes Risborough, and the Royal Botanic Gardens, Kew. The work of indexing the anatomical characters of these woods has been continued. A large number of specimens, slides, and photomicrographs has been distributed.

4. FOREST PATHOLOGY.

36. *Staff.* Mr. W. R. Day continued in charge of this section, with Mr. T. R. Peace as Assistant engaged on research work on behalf of the Forestry Commission.

37. *Frost Damage.* It is hoped to draw up in suitable form for publication during the coming year the results of the work done in the past three years on the influence of accessory factors, such as rate of thawing and freezing, humidity of atmosphere, and strength of wind, on the amount of injury caused by frost. The main part of the experimental work during the past twelve months has been concerned with this. Preparation has also been made for some exploratory work on the variation in susceptibility to frost injury of seedlings of European larch and Scots pine grown from seed obtained from various parts of Britain and the Continent of Europe. Work done in Sweden suggests that this variation in susceptibility to frost injury is a possible means of distinguishing between different races of a particular species, in this case Scots pine. The fundamental importance of this work lies in the necessity of obtaining the most suitable race of a species for establishment in any particular locality, if the healthiest and most profitable type of tree is to be obtained.

38. The inoculation experiments with *Dasyscypha calycina* and *Phomopsis pseudotsugae,* designed to investigate the relationship between infection by these fungi and frost damage, are still in progress, and those most recently made are not yet ready for examination. The present indications are that a largely negative result will be obtained as regards the parasitism of the fungi.

39. *Elm Disease.* The survey of this disease continues, but no very great fluctuations in its incidence are being observed.

Mr. Peace arranged to visit Holland at the end of the summer of 1935 to see the progress made in experimental work in that country and also to obtain some idea at first hand as to the actual state of the disease there.

40. The Institute was asked if it could arrange for an entomologist and a mycologist from the United States Department of Agriculture, to work in Oxford on the Dutch elm disease. It was found impossible to house them in the Institute buildings, but Professor Carpenter has given permission for them to work in the Hope Department, and the Institute will give them all possible assistance.

41. *Phytophthora Root Diseases of Beech and Chestnut.* The principal work of the year has been concerned with the inoculation of plants of Japanese sweet chestnut, *Castanea crenata,* with the various strains of *Phytophthora* isolated from the common sweet chestnut and also the beech. Altogether about two hundred seedlings were inoculated, and they proved to be markedly susceptible to each strain of fungus. This is contrary to all expectation and report and needs closer investigation. Next year it is proposed to infect larger plants to see if they have a greater power of resistance to a significant extent. A tour of woods infected with these fungi was made last year, and it appeared that the dry weather had decreased their destructiveness. This is to be expected, for the general experience is that they are worst on water-retentive, moist soils.

42. *Meria laricis.* The grading of the 1934 spraying experiments proved disappointing, there being little difference between the sprayed and the unsprayed plants. This is to be explained by the season, which was not favourable to infection, with the result that all the plants grew well. In 1935 at the Fort Augustus nursery the spraying experiment failed owing to the absence of infection. All the larch in this nursery have now been sprayed systematically for three years, and it would seem that this is at least partly responsible for the absence of infection. In the 1935 spraying experiment at Newton nursery, sulsol at much weaker strengths than had hitherto been used gave a very good control. Since the only objection to this spray was its cost, it must now be reckoned as the most satisfactory spray against this disease. Assessment of the effect of the control of *Meria* on height growth in this experiment will be made in the autumn of 1935.

43. *Poplar Canker.* Slow progress is being made with this disease. The preliminary inoculation experiments show that a

die-back of bark occurs if diseased tissue—in this case from *Populus eugenii*—is inserted into a healthy stem. Mr. Day visited France during the year to see the type of canker occurring there on poplars, and Mr. Peace hopes to visit some of the poplar growing districts of Holland, Belgium and North West Germany. In France the canker is of a similar type to that occurring in Britain; in both cases certain kinds of poplar are especially susceptible to it, others being much more resistant. It thus appears increasingly apparent that the most important means of control of this disease lies in the selection of resistant species or varieties. There is a great deal of work still to be done in the selection of the most suitable strains of poplar for economic exploitation. From the botanical standpoint this is largely concerned with systematic arrangement and determination, a matter which is made difficult owing to the frequent hybridization which has taken place in this genus. There is still a great deal of work to be done in the identification of the various kinds of poplar cultivated, especially on the Continent.

44. *Damping off of Seedlings.* Nursery experiments have failed owing to the complete lack of this disease due to the dry season. In the laboratory garden it has proved exceedingly difficult to produce artificial conditions in which the disease is neither catastrophic nor negligible. Under these circumstances, of the substances tried this year, only one, hortosan A., a mercury compound, proved to have value in controlling the disease. Perhaps the most interesting result has been the failure of potassium permanganate. Elsewhere the substance is considered to be a reliable control of the damping off fungi, but under the usually rather severe experimental conditions under which it has been tried in the garden it has consistently failed to give satisfactory results. The explanation of this diversity of experience has not yet appeared.

45. *Leaf Rust of Birch, Melampsoridium betulinum.* Spraying again proved successful in controlling this fungus in the nursery seed beds, but it has again proved impossible to trace the source from which the birch became infected.

46. *Butt Rot of Conifers.* Further progress has been made in the isolation of fungi from material sent in from affected trees. A number of species have occurred, but by far the most important is still *Fomes annosus.* Mr. K. St. G. Cartwright of the Forest Products Research Laboratory, Princes Risborough, has again been of considerable service to the Institute in identifying cultures of newly occurring species. A considerable number of fellings were visited both in England and in Scotland. Material was collected, notes were made as to the amount and

type of rot occurring, the soil, the vegetation and other factors possibly related to the development of the rot or serving as indications of its prevalence.

47. *Advisory Work.* There has been an increase in the amount of advisory work done during the year, the number of enquiries dealt with being about one hundred.

48. *Acknowledgements.* Special acknowledgements are due to many estate owners throughout Britain for their help in providing material for the butt rot investigation and in giving opportunity for the examination of plantations affected. Thanks are due to Dr. Regnier, Director of the Station de Zoologie Agricole, Rouen, to M. Föex, Director of the Station Centrale de Pathologie Végétale, Versailles, and to M. Granthomme of Noyon, for their great kindness and hospitality to Mr. Day when visiting France in connection with diseases of Scots pine and of poplar. The Institute also desires to acknowledge the courtesy of the Editor of the 'Times' in publishing a letter asking for information regarding the severe late frosts experienced in 1935, and the kindness of the more than three hundred correspondents who replied by furnishing useful and detailed information, a summary of which it is proposed to publish later.

5. FOREST ZOOLOGY.

49. *Staff and Instruction.* Dr. R. N. Chrystal continued in charge of this section, with Mr. J. M. B. Brown as Assistant Entomologist engaged on research work on behalf of the Forestry Commission. No students attended courses of instruction, but a B.Sc. student working mainly in the Hope Department of Zoology received help from the Entomological Section of the Institute. During the year two lectures on Forest Entomology and its importance to the forester were given to the students of the Foresters' School, Parkend, Forest of Dean.

50. *Survey of Pine Woods in the New Forest.* This work was begun in the winter of 1934-35, and had as its objectives the following:—

1. Assessment of the amount of insect damage in the pine woods, particularly those in the pole stage: to find out how the damage affects the value of the crop, and to assign the deformations produced in their correct proportion to the pine shoot beetle, *Myelophilus piniperda* L., and the pine shoot moth, *Ryacionia buoliana* Schiff.
2. Determination of the part, if any, played by minor pests such as the pine sawfly (*Lophyrus*): results to date

indicate that serious damage is widespread in the New Forest, with the result that the quality of the timber, especially that destined for use as telephone poles, is materially affected.

51. As might be expected, the pine shoot moth is more important in woods up to the first thinning stage, and the pine shoot beetle after this stage is passed. An extensive outbreak of the former insect occurred during the years 1917—1920, while the war years also witnessed widespread attacks of the pine beetle. The commonest forms of damage caused by the two insects are very similar and difficult to distinguish in practice. The sawfly is prevalent in certain parts of the forest, and its attacks frequently result in the death of the leading shoots. The biological work on the pine shoot beetle progresses steadily. The breeding habits have been studied, and the question of the numbers of broods is still under investigation. An attempt is being made to correlate the intensity of the infestation with the supply of available breeding matter. In connection with this investigation, co-operation has been maintained with Mr. H. S. Hanson of the Farnham Royal Laboratory, Imperial Institute of Entomology, in his studies of the parasites and predators and their value in biological control.

52. *The Pine Weevil* (*Hylobius abietis L.*). Trapping experiments have been continued. Last year's experiments have been repeated with four of the traps which gave the best results, and experiments have been carried out to test the best methods of collection. Devices to refresh bark which has become unattractive to the beetles by treatment with resin, turpentine, etc., have also been tried. An experiment has been started with the idea that it might be possible to trap the indigenous beetle population of the standing wood before felling, and thus prevent extensive increase after felling. This experiment was begun with trapping in one belt and biological control measures, directed by Mr. Hanson, in a second belt. So far the yields from the traps are very encouraging. Much still remains to be done in the study of the biology of the pine weevil. In co-operation with Mr. Hanson, work has been carried out on the duration of the larval and pupal stages, on the longevity of the adults and their powers of migration, and on the chief feeding and breeding seasons.

53. *The Pine Shoot Moth.* A study of the parasitic complex associated with this moth has now been started in Norfolk and elsewhere. This is intended to ascertain if the apparently

greater liability to attack which appears in certain localities can be correctly attributed to a deficiency in the numbers of certain essential parasites, and if any practical measures can be devised for encouraging the parasites in areas threatened with severe infestation.

54. *The Oak Tortrix Moth* (*Tortrix viridana* Schiff.). Interesting observations have been made during the past season on the following points—

1. The activity of hymenopterous parasites in gradually suppressing an outbreak, and the ecology of the most important of these parasites,

2. The influence of late frosts on caterpillar outbreaks.

The year 1934 was again a bad year for defoliation in most parts of the Forest of Dean, and there was an appreciable increase in the numbers of the caterpillars of the oak tortrix in the High Meadow oakwoods. As had been anticipated, defoliation was much less severe in 1935, though moderate damage was observed in the High Meadow woods, which had hitherto been immune. There is the possibility of an outbreak in these parts in 1936 or 1937, although this may be checked by natural controlling agencies. During the past winter a detailed report on this investigation was prepared; it has now been revised and will shortly be ready for publication.

55. *Chafer Beetles.* Experiments were carried out in August 1934 in Delamere nursery on the treatment with paradichlorobenzene of nursery beds infested by the grubs of the garden chafer (*Phyllopertha horticola*). The first assessments made showed apparent negligible results, but the crystals, which had been dibbled into the ground, gave off vapours which permeated slowly through the soil during the winter, with the result that a considerable number of the larvae and pupae were killed and, more striking still, that some at least of the treated beds were effectively protected against attack by the swarming beetles in June, 1935. This result opens out a new line of investigation. At the present moment, however, interest centres round certain experiments which are being carried out in co-operation with Imperial Chemical Industries. The following substances are being tested:—

(a) Seekay soil fumigant, a mixture of ortho- and para-dichloro-benzene,

(b) an emulsion known as M.G.15, which is very toxic to 'leatherjacket' larvae, but which has not, so far, been tested against chafers.

The experiment has been planned in such a way that when the results are forthcoming early in October, exact information should be available relative to the insecticidal properties, the effects, if any, on the plants, and the cost of application of the substance, tried out in various strengths. The emulsion M.G.15 is specially worthy of trial on account of its low cost. A questionnaire was recently sent out from London to all the nurseries of the Forestry Commission, and has elicited useful information on the incidence of chafer damage and the conditions associated with it. This information has still to be set in order.

56. *The Society for British Entomology, First Annual Congress.* The first annual Congress of the Society for British Entomology was held in Oxford in July, 1935, and was attended by some 75 members. The members visited the Department of Forestry, where they were shown some exhibits dealing with its entomological work, and an address was delivered by Dr. Chrystal entitled 'The Present Entomological Problems of the Forestry Commission.'

57. *Advisory Work.* The number of enquiries dealt with during the year was over fifty, a slight increase over the previous year. In addition to these, there was an increase in the number of visits paid to the Institute by persons seeking information and advice.

6. FOREST ENGINEERING AND UTILIZATION.

58. Mr. A. H. Lloyd continued in charge of this section. The probationers underwent field training with the R.E. Section, O.U.O.T.C., in bridge construction, pile-driving, water-supply and wire-ropeway erection. The usual course in road alignment and construction was given to one probationer, the others having completed it previously. Officers on leave from Northern Rhodesia and Palestine were given specialized work in problems of forest engineering and utilization. Visits were paid to various sawmills and works of interest in the neighbourhood of Oxford, as well as to the Forest Products Research Laboratory, Princes Risborough, the G.W.R. Carriage Works at Swindon, and the sawmills and utilization branches of Forest Products, Ltd., Huntley, Glos. For assistance in connection with these visits, special thanks are due to the Director of the Laboratory, the Chief Engineer of the G.W.R. Carriage Works, and the Manager, Forest Products, Ltd.

IV. *LIBRARY AND INFORMATION BRANCH.*

59. *Library.* During the year 60 books and 734 pamphlets and bulletins were entered in the library. There are about 200 books and some 1,000 pamphlets awaiting entry, which have been held up owing to pressure of other work. Sets of periodicals now number 134, an increase of 10 over last year, and current periodicals 99, an increase of 4, one having been dropped. Six sets represent early forestry series of great interest; in addition, certain important gaps have been filled in existing series. The number of books borrowed, apart from those consulted in the library, was 2,517; of these 185 were borrowed from outside the Department. Several interesting old maps of historical value were acquired. Information for the Aslib Quarterly List of Recommended Books is now regularly sent to the headquarters of that Association in London, and notes of foreign books purchased are made for Bodley's Librarian, at his request.

60. Acknowledgements for presentations of books, etc., to the library are due to Mr. J. Macdonald, Dr. Helen Bancroft, Mr. Bourne, Dr. Burtt Davy, Dr. Chalk, Professor A. G. Tansley, Lord Northbrook, Mr. G. F. Ballance, Mrs. Griffin, Lambourn, Miss E. C. Steedman, Southern Rhodesia, Dr. W. C. Lowdermilk, Washington, U.S.A., the Librarian of the School of Rural Economy, Oxford, the High Commissioner for the Union of South Africa, the Empire Forestry Association, the Colonial Office, and the Crown Agents for the Colonies. Acknowledgements are also due for assistance received from other libraries, particularly the Science Library, South Kensington, the Radcliffe Science Library, and the libraries of the School of Rural Economy, Oxford, and the School of Agriculture, Cambridge.

61. *Information Branch.* This branch has developed into an information bureau of great importance. The number of enquiries dealt with is already considerable, and is steadily increasing. These emanate not only from different parts of the Empire, but also from foreign countries, and frequently involve the detailed examination of material or the preparation of notes entailing much time and labour. In addition to this, the number of persons, not regular students, who spend varying periods of time at the Institute to study on their own account with the help of the library and reference files, is constantly increasing. These independent students receive assistance from the staff, and in certain cases their visits involve the preparation of bibliographies on the subjects of study.

62. Mention may be made of the steps now being taken to publish periodical references and abstracts of current forest literature. The regular publication of such references and abstracts would have been started before now had it not been for the delay occasioned by the introduction of a scheme of international co-operation being brought into force with effect from the 1st January, 1934. The procedure to be followed in regard to literature published prior to that date will differ materially from that to be followed subsequently, and the two may therefore be described separately.

63. So far as literature published up to 31st December, 1933, is concerned, referencing under a simple classification scheme was begun by the Oxford School of Forestry some time before the Institute came into being. Since then it has been carried on steadily, the cost being shared between the School and the Institute, and is now approaching completion up to the end of 1933. The references cover more than half a century, and although they do not pretend to be exhaustive, they actually represent the bulk of the periodical literature published for many years past in English, French and German, with a certain amount of literature published in other languages. The desirability of publishing these references has been repeatedly urged, and it is therefore proposed to bring them out in successive numbers as the various portions are ready for the press. It is hoped that the first number will be ready early in 1936.

64. As regards current literature published from 1st of January, 1934, onwards, the Director, as Chairman of a Committee on Forest Bibliography connected with the International Union of Forest Research Organizations, has been engaged for some time in bringing into effect a plan whereby references and abstracts will be prepared under a scheme of international co-operation, which will distribute the labour and cost among a number of countries. The system of classification adopted is one prepared by Dr. Ph. Flury of Zürich and based on Dewey's decimal system. A German edition of Flury's system has recently been published at Zürich, and an English translation, prepared at the Imperial Forestry Institute, is now in the press and will be published shortly. Under this scheme of international co-operation the Institute will undertake the issue of periodical references and abstracts, in English, of current forest literature published throughout the world. By this means it is hoped that a complete record of such literature will be maintained, and that forest officers and others interested in forestry will have an opportunity, such as they have never previously enjoyed, of keeping in touch with the progress of forestry throughout the world.

65. *Photographic Collection.* Considerable additions to the photographic collection have been made during the year, but progress in classifying and cataloguing the collection is slow owing to the short-handed condition of the staff. Acknowledgements for the presentation of photographs and the loan of negatives are due to the Sibthorpian Professor of Rural Economy, Oxford, the Director of the Forest Products Research Laboratory, Princes Risborough, Mr. A. L. Bolton, Mr. R. Bourne, Dr. Burtt Davy, Mr. C. E. Duff, Mr. Heath, Major Heyder, Mr. W. D. MacGregor, Mr. N. S. Stevenson, Mr. C. Vigne, and Mr. C. V. Wallace, and to Mr. H. N. Dixon for his generous gift of 109 lantern slides showing stem sections.

66. *Exhibitions.* A set of Institute publications was sent to Coimbra University, Portugal, at its request, on the occasion of its Exhibition of Learned British Periodicals and Reviews. Exhibitions of Institute publications were also arranged for the Congress of the Society for British Entomology and the Third International Soil Science Congress.

V. *BUILDINGS.*

67. Financial provision sufficient to justify a beginning being made with the erection of new buildings was not yet forthcoming, but steps were taken to place the whole situation before the Empire Forestry Conference in the hope of obtaining the balance required to enable building operations to commence.

VI. *FINANCE.*

68. The detailed accounts of the Institute will be published, after audit, in the Oxford University Gazette. The following is a summary of income and expenditure for the year :—

Income. Colonies, £4,719; Dominions, India and others, £1,267; Forestry Commission, £3,212; Department of Scientific and Industrial Research, £150; Interest on Capital Account, £504; Other Receipts, £269. Total Income, £10,121.

Expenditure. Staff Salaries and Pension Contributions, £6,048; Instructional Supplies, £393; Travelling, £264; Administrative, £2,602; Miscellaneous, £79; Transfer to Information Branch, £167. Total Expenditure, £9,553.

R. S. TROUP, *Director,*
Imperial Forestry Institute.

OXFORD.
22nd November, 1935.

APPENDIX I

PUBLICATIONS.

The following publications have appeared during the year :

BANCROFT, H. New Material of *Monotes Keratingii* from the Gold Coast. (Kew Bulletin, 1934).

The taxonomic History and geographical Distribution of the Monotoideae. (American Journal of Botany, Vol. 22, 1935).

Fossil dicotyledonous Woods from Mount Elgon, East Africa. I. *Dipterocarpoxylon africanum*. (*Idem.*, Vol. 22, 1935).

Fossil dicotyledonous Woods from Mount Elgon, East Africa. II. *Dryoxylon elgonense*. (*Idem.*, Vol. 22, 1935).

Notes on the Status and Nomenclature of the British Elms. Seven articles. (Gardeners' Chronicle, August to November, 1934).

The Elm Problem. (Quarterly Journal of Forestry, Vol. 29, 1935).

A Review of Ideas concerning floral Morphology. (Botanical Review, Vol. 1, 1935).

A new phylogenetic Classification of the Monocotyledons. (Empire Forestry Journal, Vol. 13, 1934).

BOURNE, R. Working Plan Headings. (Empire Forestry Journal, Vol. 13, 1934).

Prefatory Note. The Place of Thinning in Wattle Silviculture and its Bearing on the Management of exotic Conifers. (*Idem*, Vol. 13, 1934).

A Problem in regular Forests. (*Idem.*, Vol. 14, 1935).

The Efficiency of irregular Stocking. (Paper for British Empire Forestry Conference, 1935).

Air Survey. (Paper for meeting of British Association, Norwich, 1935).

BURTT DAVY, J. Male Trees of *Salix alba* var. *caerulea*. (Forestry, Vol. 9, 1935).

Taraxacum magellanicum Comm. (Paper for meeting of Royal Society of South Africa, 19th June, 1935).

The taxonomic Position of the Sympetalae—Pentacyclicae. (Paper for Sixth International Botanical Congress, Amsterdam, 1935).

Chalk, L., and Chattaway, M. M. Measuring the Length of Vessel Members. (Tropical Woods, No. 40, 1934).

Factors affecting dimensional Variations of Vessel Members. (*Idem,* No. 41, 1935).

Day, W. R. Development of Disease in living Trees. (Journal of the British Wood Preserving Association, Vol. 4, 1934).

The Relation between Disease and the Constitution and Environment of the Tree. (Journal of the Royal Agricultural Society, Vol. 95, 1934).

Dickson, J. Studies in floral Anatomy. II. The floral Anatomy of *Glaucium flavum,* in Relation to that of other Members of the Rhoeadales. (Proceedings of the Linnean Society, Session 1934-35).

Hoyle, A. C., and Dunkley, H. L. New Trees and Shrubs from tropical Africa. IV. (Kew Bulletin, 1935).

Macdonald, J. The ideal Plantation. (Quarterly Journal of Forestry, Vol. 28, 1934).

New provisional Yield Tables for Japanese Larch in Great Britain. (Scottish Forestry Journal, Vol. 49, 1935).

Nursery Investigations. I. The Use of Sand as a covering Material in Seed-beds. II. Stratification as a Means of improving the Germination and Production of Seed of Douglas Fir. (Forestry, Vol. 9, 1935).

Troup, R. S. Some recent silvicultural Developments in Europe. (Paper for British Empire Forestry Conference, 1935).

Forest Trees and Timbers of the British Empire.

No. 3. Fifteen South African High Forest Timber Trees. By J. Burtt Davy, L. Chalk, M. M. Chattaway, F. S. Laughton and M. H. Scott. 1935.

Check-Lists of the Forest Trees and Shrubs of the British Empire.

No. 1. Uganda Protectorate. By J. Burtt Davy and F. Bolton, with the collaboration of N. V. Brasnett, Conservator of Forests, Uganda, and W. J. Eggeling and C. M. Harris, Assistant Conservators. 1935.

APPENDIX II

Classified List of Botanical Identifications made during 1934-35.

Belgian Congo	16
Egypt	1
Gold Coast	397
Nigeria	218
Sierra Leone	21
Uganda	74
Kenya Colony	130
Tanganyika Territory	235
Nyasaland	246
Northern Rhodesia	150
Southern Rhodesia	218
Africa, various	34
Zanzibar	66
Cyprus	15
Fiji Islands	1
India	1
California	1
British Honduras	34
Trinidad	3
For Forest Products Research Laboratory, Princes Risborough	301
For Imperial Forestry Institute and various correspondents	594
	2,756

APPENDIX III

LIST OF BOTANICAL SPECIMENS RECEIVED.

The following is a list of herbarium and wood specimens received, for which special acknowledgements are due :—

I. Herbarium Specimens.

EUROPE. *The British Isles:* Various correspondents, 182; The Forest Products Research Laboratory, Princes Risborough, 262; Professor R. S. Troup, 1; Dr. J. Burtt Davy, 97; Dr. R. N. Chrystal, 3; Miss M. M. Chattaway, 1; Mr. J. Macdonald, 14; Mr. W. R. Day, 49; Mr. T. R. Peace, 18; Miss K. Allison-Brown, 1. *Germany:* The Director, Botanischer Garten und Museum, Berlin-Dahlem, 151; Dr. Otto Behr, 95; through the Arnold Arboretum, Harvard University, 38. *Mediterranean Region:* Through the Arnold Arboretum, 60. *Sweden:* Dr. Björn Floderus, 8.

ASIA. *Andaman Islands:* Through the Forest Products Research Laboratory, Princes Risborough, 3. *Cyprus:* The Conservator of Forests, Nicosia, 113. *Hong Kong:* Through the Forest Products Research Laboratory, Princes Risborough, 2. *India:* The Forest Research Institute, Dehra Dun, 2. *Malaya:* The Forest Research Institute, Kepong, Selangor, 239; The Director, Botanic Gardens, Singapore, 91.

AFRICA. *Belgian Congo:* Professor Dr. W. Robyns, Director, Jardin Botanique de l'État, Brussels, 203. *Egypt:* Mr. A. R. Herdman, A.E.O. Refinery, Suez, 1. *Gold Coast:* The Conservator of Forests, Accra, through Mr. C. Vigne, 246; Through the Forest Products Research Laboratory, Princes Risborough, 5. *Ivory Coast:* Through the Forest Products Research Laboratory, Princes Risborough, 1. *Kenya Colony:* The Conservator of Forests, Nairobi, 124. *Liberia:* Through the Arnold Arboretum, Harvard University, 15. *Nigeria:* Mr. J. R. Ainslie, 3; Mr. J. D. Kennedy, 171; Mr. K. R. MacDonald, 30; Mr. J. H. Mackay, 26; Mr. W. D. MacGregor, 42; Mr. A. F. A. Lamb, 23; Mr. P. C. Lancaster, 45; Mr. D. R. Rosevear, 1; Mr. J. Smith, 18; Mr. B. Pollard-Urquhart, 19. *Nyasaland:* The Conservator of Forests, Zomba, 76; Mr. P. Topham, 1; Mr. R. G. Ross Townsend, 38. *Northern Rhodesia:* Mr. C. E. Duff, 57. *Southern Rhodesia:* The Chief Forest Officer, 1; Mr. R. H. Finlay, 1; Mr. A. A. Pardy, 28; Mr. H. Boyd Gilliland, 433. *Tanganyika Territory:* The Conservator of Forests, Morogoro, 103; Mr. B. D. Burtt, 118; Mr. H. J. A. Rea, 32. *Uganda:* The Conservator of Forests, En-

tebbe, 8; Mr. V. E. Fuchs, 244 specimens (collected by the late Mr. W. R. H. Martin, on The Lake Rudolf Rift Valley Expedition). *Union of South Africa:* The National Herbarium, Pretoria, 110; The Conservator of Forests, Pretoria, 5; Mr. F. S. Laughton, Knysna, 19. *East Africa* (various localities): Through the Director, Royal Botanic Gardens, Kew, 110. *St. Helena:* Mr. K. E. Toms, 1. *Zanzibar:* Mr. J. H. Vaughan, 156.

AMERICA. *United States:* The Arnold Arboretum, Harvard University, 57; The Smithsonian Institution, Washington D.C., 106; The New York State College of Forestry, Syracuse, 197; Miss F. Bolton, California, 1; Mr. A. L. Bolton, California, 1. *Tropical America:* The School of Forestry, Yale University, 161. *British Guiana:* The Conservator of Forests, Mazaruni, 244. *British Honduras:* The Conservator of Forests, through the Forest Products Research Laboratory, Princes Risborough, 25. *Trinidad:* The Conservator of Forests, through the Forest Products Research Laboratory, Princes Risborough, 2.

2. Wood Specimens.

Hand specimens for type collection:—

EUROPE. The Forest Products Research Laboratory, Princes Risborough, 11; Mr. J. Macdonald, 31; Dr. J. Burtt Davy, 8.

ASIA. *Malaya:* The Forest Research Institute, Kepong, F.M.S., 580; Mr. M. R. Henderson, Royal Botanic Gardens, Singapore, 17.

AFRICA. *Gold Coast Colony:* The Conservator of Forests, through Mr. C. Vigne, 19. *Kenya Colony:* The Conservator of Forests, through the Forest Products Research Laboratory, Princes Risborough, 17. *Nigeria:* The Director of Forests, 1. *Northern Rhodesia:* Mr. C. E. Duff, 31. *Sierra Leone:* The Conservator of Forests, through Mr. C. V. Wallace, 1. *Uganda:* The Conservator of Forests, through Messrs. C. M. Harris and W. J. Eggeling, 82.

AMERICA. *Argentine:* H.R.H. The Prince of Wales, 400. *British Honduras:* The Conservator of Forests, 12. *Trinidad:* The Conservator of Forests, through the Forest Products Research Laboratory, Princes Risborough, 39.

APPENDIX IV

CLASSIFIED LIST OF HERBARIUM EXCHANGES, 1934-35.

	Sent.	*Received.**
Arnold Arboretum (Dr. A. Rehder)	270	170
British Museum (Mr. J. Ramsbottom)	284	—
Jardin Botanique de l'État, Brussels (Professor Dr. W. Robyns)	173	203
Botanisches Museum, Berlin-Dahlem (Dr. R. Pilger)	120	95
Royal Botanic Gardens, Kew (Sir Arthur W. Hill)	780	110
New York Botanical Garden, Bronx Park (Dr. E. D. Merrill)	100	—
New York State College of Forestry, Syracuse (Professor H. P. Brown)	45	197
Division of Plant Industry, Department of Agriculture, Pretoria, South Africa (Dr. I. B. Pole Evans)	—	110
Botanic Gardens, Singapore (Mr. R. E. Holttum)	—	91
Smithsonian Institution, Washington D.C. (Dr. W. R. Maxon)	150	106
East African Agricultural Research Institute, Tanganyika Territory (Mr. W. Nowell)	300	—
Yale University, School of Forestry (Professor S. J. Record)	270	—
	2,292	1,082

* As detailed in Appendix III.

PROSPECTUS.

Scope of Work. The Institute provides courses of advanced study; its work comprises (1) post-graduate training of probationers for the forest services and other qualified persons, (2) training of research officers in special subjects, and (3) courses for selected officers already serving.

The Institute does not undertake to provide a general training in Forestry such as is given at Universities or other centres where this subject is taught.

Admission of Students. Only persons falling within one or other of the following categories are eligible for admission to the Institute:—

(*a*) Those possessing a Degree in Forestry or a Diploma or equivalent certificate of having satisfactorily completed an approved course of training in Forestry, who have been selected as probationers for the higher branch of some forest service;

(*b*) Graduates with honours in Science who desire to become specialists in some branch of work connected with Forestry;

(*c*) Forest officers deputed by their Governments to attend courses with the view of bringing their professional knowledge up to date;

(*d*) Students of approved qualifications not included in the first three categories who are admitted on the recommendation of Overseas Governments;

(*e*) Students with a University training in Forestry who may wish to attend the Institute on their own account and at their own expense.

Note.—(1) No officer in any Public Service in the British Empire will be admitted to the Institute unless he is officially deputed by the Government under which he is serving; no application from any such officer will be considered unless it is submitted through and approved by the Head of his Department; (2) The Institute reserves the right to refuse the admission of applicants other than nominees of contributing Departments and Governments.

Names of applicants for admission should be sent, together with details of previous training and subjects which it is proposed to study, to the Director, Imperial Forestry Institute, Oxford, at least three months before the date on which it is proposed to join: the Director cannot undertake to consider applications received at shorter notice.

Terms and Vacations. The academic year begins early in October, and is divided into the following Terms and Vacations:

Michaelmas Term (eight weeks, early October to early December).
Christmas Vacation (early December to middle of January).
Hilary Term (eight weeks, middle of January to middle of March).
Easter Vacation (middle of March to end of April).
Trinity Term (eight weeks, end of April to end of June).
Long Vacation (early July to early October).

Courses of Study. The courses of study are normally of three kinds:—

(1) For post-graduate probationers who have not yet taken up their appointments: the course ordinarily extends over one academic year, beginning October, and including practical work in part of the Easter and Long Vacations.

(2) For forest officers on leave, or others who propose to attend the Institute with the view of spending some time (normally one year) in specializing in some particular branch of work; the course of study will be adapted to individual needs, and will ordinarily begin in October.

(3) For forest officers on leave who propose to spend only part of the year on 'refresher' courses. *These should attend during the spring and summer months, and not between October and January.* The distribution of work in the more usual subjects studied in 'refresher' courses is as follows:—

Silvicultural Systems: Trinity Term, with Continental tours in Easter and Long Vacations (middle of March to middle of September).

Methods of Artificial Regeneration: Hilary and part of Trinity Terms and Easter Vacation (middle of January to end of May).

Forest Management, Regional Survey, Stocktaking and Working Plans: Easter Vacation, Trinity Term and Long Vacation (middle of March to middle of August).

Tropical Silviculture: Trinity Term (end of April to end of June).

Surveying: Trinity Term (end of April to end of June).

Forest Utilization and Engineering: (1) Special work in timber mechanics and wood seasoning and preservation at the Forest Products Research Laboratory, Princes Risborough, can be arranged at any time throughout the year.

(2) *Road Project:* Trinity Term (end of April to end of June).

Systematic Botany: (1) *Full course:* three Terms (middle of October to end of June).

(2) *Short courses:* (*a*) two Terms—Hilary and Trinity (middle of January to end of June); or (*b*) one Term, Hilary or Trinity.

Continental Tours: Easter and Long Vacations.

Persons wishing to join Continental tours are reminded that their visits should coincide with the normal tours arranged in the Easter and Long Vacations (*i.e.* the middle of March to the end of April, and early July to early October). Neither the Institute nor any member of its staff is authorized to arrange visits or to furnish introductions on behalf of persons desiring to visit Continental centres on their own account.

Subjects of a more special kind, such as Entomology, Mycology, Wood Structure, Methods of Ecological Survey, Soil Properties, etc., can be studied at times to be arranged to suit individual requirements, provided notice of not less than three months is given.

Fees. An inclusive fee of £150 will be charged for instruction for one whole year at the Institute. If the course of studies extends over less than one year, the fees charged will be £50 per Term and £2 per week for tours in the Vacations. These fees will include all charges for instruction both at Oxford and on tour, as well as for the use of apparatus, materials, library, etc., they will not include living and travelling expenses. Reduced fees may be charged in individual cases, at the discretion of the Director, to students attending the Institute at their own expense who do not belong to any Public Service.

No fees will be charged to students deputed by Governments and Departments which contribute to the funds of the Institute.

Expenses. Living expenses at Oxford during Term are roughly estimated at from £3 10*s.* to £4 10*s.* a week. Expenses on the Continent vary considerably with locality and other factors.

Membership of the University. Students of the Institute may, at their own discretion and if possessed of the necessary qualifications, be matriculated as members of the University; particulars regarding admission, expenses, etc., are given in a pamphlet entitled *General Information concerning Admission, Residence, etc.,* obtainable (post free 6½*d.*) at the Clarendon Press Depot, High Street, Oxford. Students becoming members of the University will be eligible for the Diploma in Forestry on fulfilling the conditions laid down by the University Statutes.

PUBLICATIONS ISSUED BY THE IMPERIAL FORESTRY INSTITUTE.

OXFORD FORESTRY MEMOIRS.*

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